

TECHNICAL TEXTILES

SUBJECT:ADVANCED TEXTILES AND FINISHES

UH06CTCL03

CLASS: T.Y.B.Sc.(Home), Textiles and Clothing

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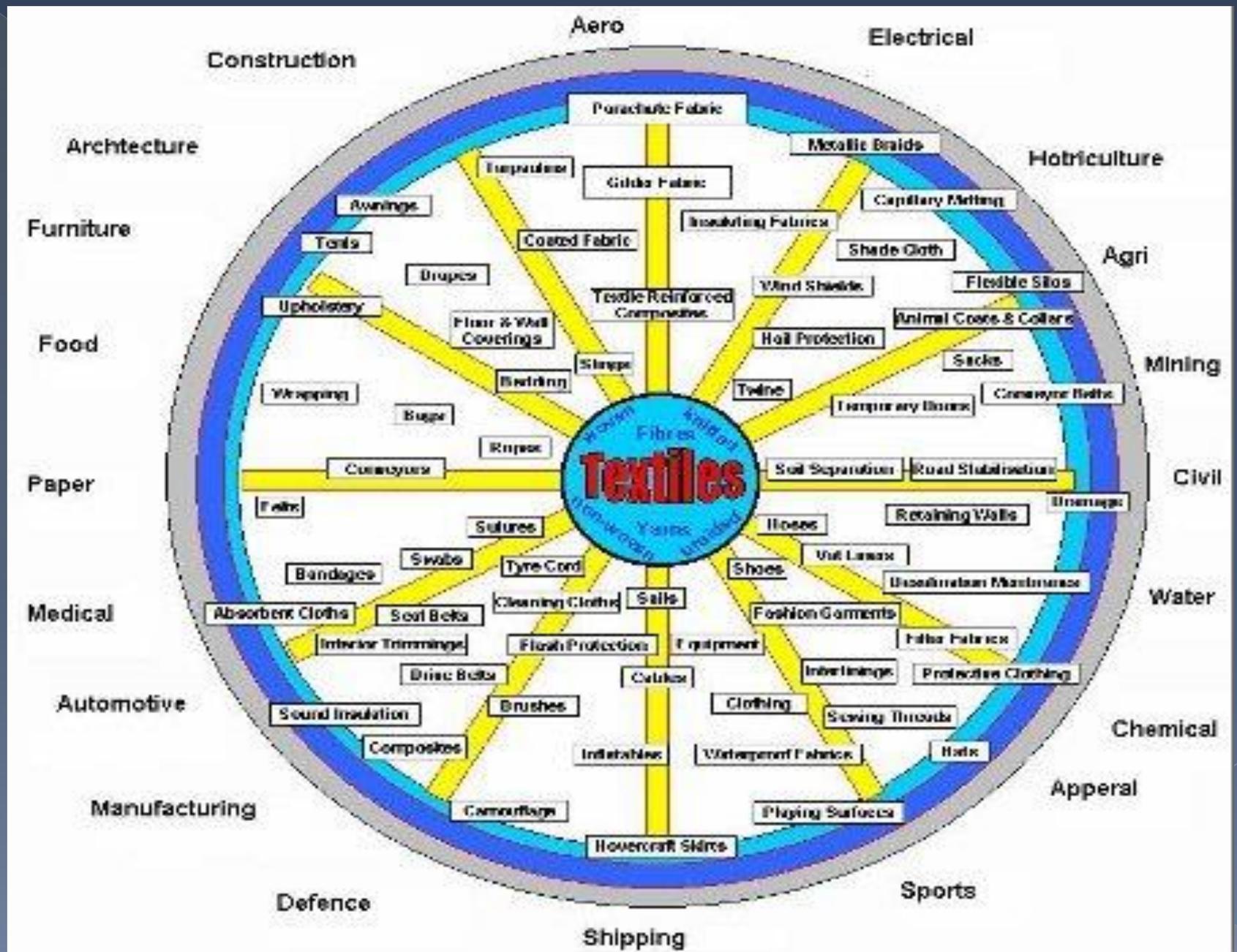
Vallabh Vidyanagar, Gujarat

TECHNICAL TEXTILES

DEFINITION:

It is defined as the textile materials and products manufactured primarily for their technical performance and functional properties rather than their aesthetic or decorative characteristics, as stated by Memon & Zaman(2007).

Nemoz(2001), defined as, “Technical textiles are materials meeting high technical and quality requirements(mechanical, thermal, electrical, durability.....) giving them the ability to offer technical functions.



MAIN PROCESSES OF TECHNICAL TEXTILES ARE

- i) Knitting
- ii) Weaving
- iii) Braiding
- iv) Nonwoven
- v) Tufting

MAJOR WAYS AND TECHNIQUES TO PRODUCE TECHNICAL TEXTILES

- i) Thermo forming
- ii) Three- dimensional weaving
- iii) Three- dimensional knitting
- iv) Fabrics produced by Nanotechnology
- v) Heat-set synthetics
- vi) Finishing treatments such as water resistance coatings & holographic laminates
- vii) Hand-made elements such as stitch or appliqué

MATERIALS USED FOR MAKING TECHNICAL TEXTILES

Metals, like steel

Minerals, like asbestos and glass

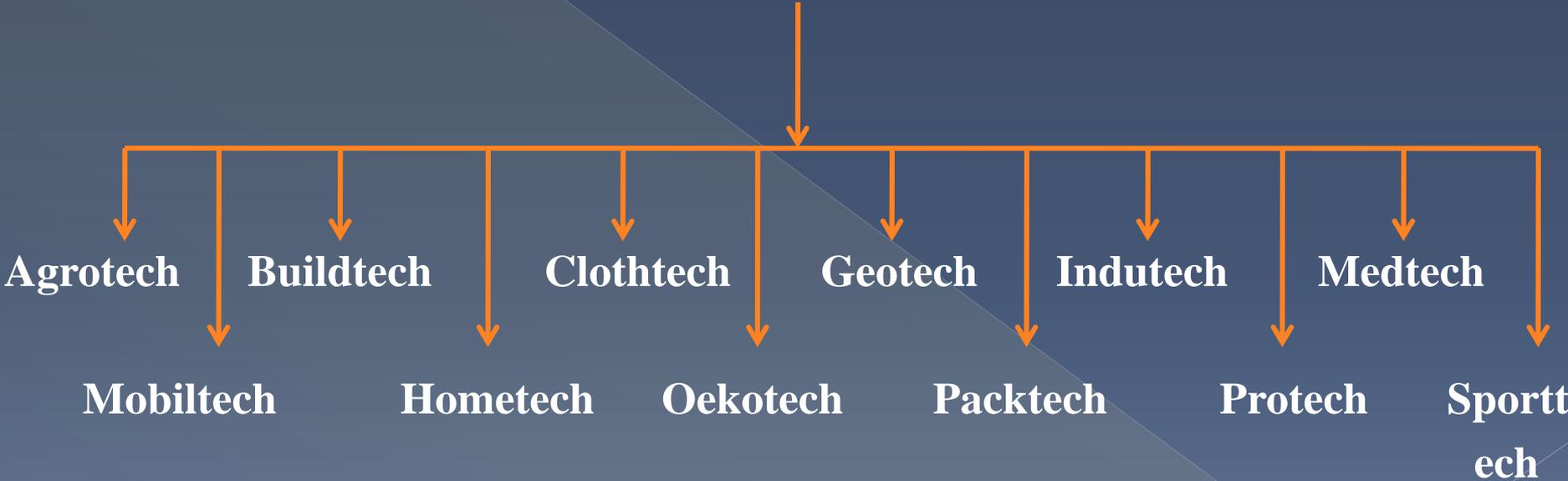
Synthetic polymers, like PES, PA, PAN, PP etc.

Regenerated fibers, like rayon, acetate

Natural fibers, like cotton, jute, wool etc.

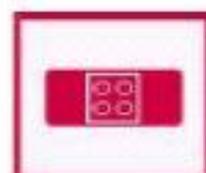
CLASSIFICATION OF TECHNICAL TEXTILES

TECHNICAL TEXTILES



**Agrotech**

Horticulture + landscape gardening, agriculture + forestry, animal keeping

**Meditech**

Hygiene, medicine

**Buildtech**

Membrane, lightweight + massive construction, engineering + industrial building.

**Mobiltech**

Cars, ships, aircraft, trains, space travel

**Clothtech**

Garments, shoes

**Oekotech**

Environmental protection, recycling, waste disposal

**Geotech**

Road infrastructure, Railways, Irrigation and Hydraulic structures, Waste Landfills, Dams etc.

**Packtech**

Packaging, protective-cover systems, sacks, big bags, container systems

**Hometech**

Furniture, upholstery + interior furnishing, rugs, floor coverings

**Protech**

Person and property protection

**Indutech**

Filtration, cleaning, mechanical engineering, chemical industry

**Sporttech**

Sport and leisure, active wear, outdoor, sport articles.

AGROTECH

Agrotech also called as Agrotex ,refers to the woven, nonwoven and knitted textiles used for agriculture, animal husbandry, forestry, horticulture, landscaping and fish farming. These textiles have to be strong, elongated, stiff, biodegradable, resistant to sunlight & toxic environment.

Classification of Agro textile



Hail protection fabrics- maintains soil humidity and increases soil temperature, thus , extends the growing season.

Wind control fabrics- protects buildings used for rearing cattle, sheep, goat and pig.

Weed protection fabrics- control weed by ground covering fabrics thus avoiding use of harmful chemicals/ pesticides and herbicides.

Sunshade fabrics- as shade fabric for vegetable, horticulture and animal husbandry.

Insect repellent fabrics- protects vegetables and fruits, crops against bird and insect damage.

Rain protection fabrics- protects flowers and berries from damage on rainfall.

Cold and frost control fabrics- protects low growing, high value field crops from frosts, wind, cold and birds.

Temperature control fabrics- maintains temperature and humidity of crops, fruits and vegetables during storage and transportation.

FIBRE USED

PRODUCTS MANUFACTURED

Jute

Protective agro nets

Coir

Geomat, mulch, geotextiles, cords, ropes, lines

Hemp

Agro nets, lines

Polyester

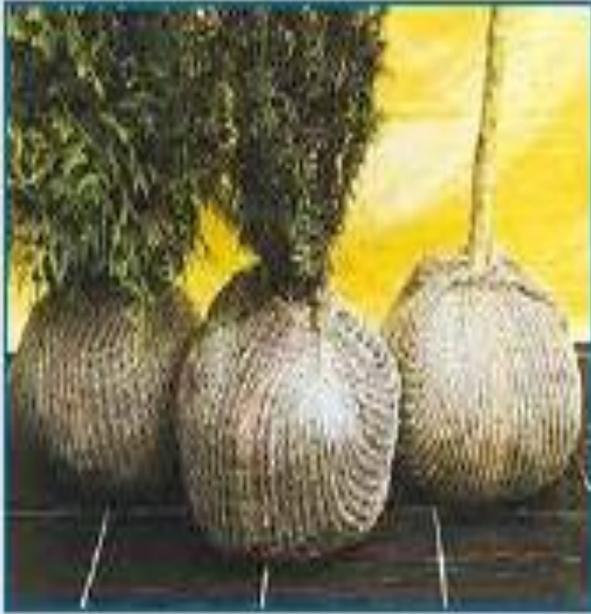
Belts, shade nets, wind breakers

Nylon

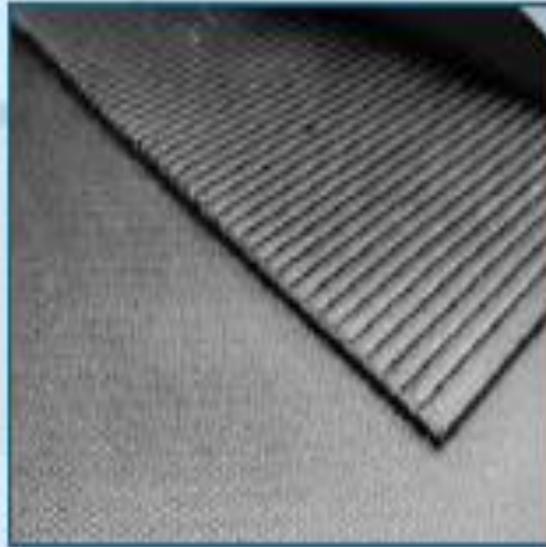
Geomat, composite drains, wind breakers, high temperature resistant

Polypropylene

Mulch mats, vegetable/ fruit bags, sunscreen, tree wrapper, protective nets, bird net, wind shield, packing sacks.



Nets for root balls



Mats for animals



Shading textiles

AGROTECH

BUILDTECH

Build tech also known as Buildtex, refers to the woven, nonwoven and knitted textiles used in construction and architectural applications for building insulation, wiring covers, pool liners and covers, venetian blinds, duct tape, gaskets and seals, wall coverings, noise pollution, protection against the sun, building safety, façade foundation system in order to control vibration and avoid damage in RCC structure.

FIBRE USED : Cotton, Nylon, Polyester ,glass fiber, PES

FABRICS USED: PVC coated high tenacity PES, Teflon coated glass fiber fabrics or silicon coated PES specially used football stadia, airports and hotels.



Textile membrane



Textile drainage



Textile roof-greening

BUILDTECH

CLOTHTECH

Clothtech refers to the woven, nonwoven and knitted textiles that represents functional, most often hidden components, of clothing and footwear such as sewing thread, collar and cuff interlinings, shoulder pads, wadding in jackets, in shoe soles insulating fiberfill. Especially in the finishing process where fabric is treated under pressure and high temperature the technical textile supports the fabric for smooth processing.

FIBERS USED: Blends of polyester, modal, viscose, nylon etc.

GEOTECH

Geotextiles refers to woven, nonwoven and knitted type of fabrics placed between the soil and a pipe, galsion or retaining wall, to enhance water movement and retard soil movement. It also acts as an blanket to add reinforcement in embankments and separation.

FIBRES USED

PRODUCTS

Jute

Geomat, geotextiles

Coir

Geomat

Polyester

Geomat, geo grid, geotextiles, geo-rganthetics, composite drain

Acrylic

Geomat, geo grid

Nylon

Geomat, composite drain

Polypropylene

Geomat, geo net, geo cell

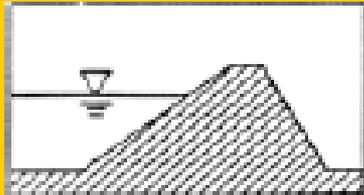
PROPERTIES:

1. It possess grab strength and thickness.
2. Geo textiles should have low moisture absorption capacity.
3. It should be air and water permeable.
4. Geo textiles should be biodegradable.
5. It should possess superior drapability and flexibility.

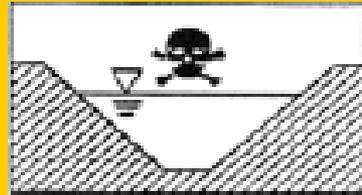
APPLICATION:

1. Woven geo textiles are used for coastal works, waterways, embankments and in forming geo cell for roads.
2. Nonwoven geo textiles are used for filtration, drainage, reinforcement between soil, stone , as erosion prevention and separation in roads and railway works, as filter fabric in dams, under drainage system liners for pile foundation etc.
3. Knitted geo textiles are used as bags for protection of dams, riverbanks.

GREAT VARIETY OF APPLICATIONS



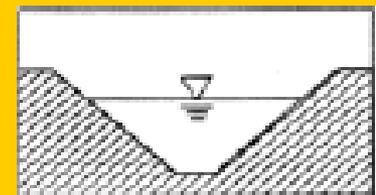
reservoirs,dams



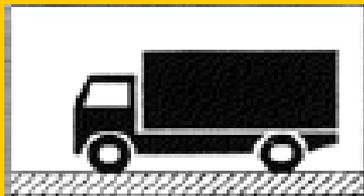
liquid waste



solid waste



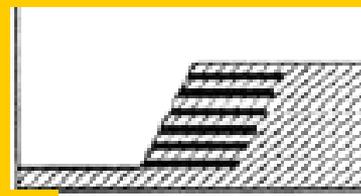
canals



roads



railways



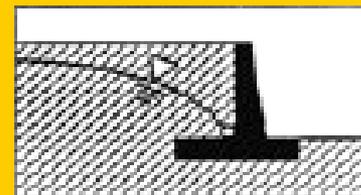
foundations, retaining walls



erosion-
control
systems



tunnel
construction



drainage
systems

HOME TECH

Home tech refers to woven, nonwoven and knitted fabrics meant for interior decoration and furnishing in upholstery, wall décor, window treatments, bedroom ensembles, carpets, quilted blanket, bathrooms in home, institutes, offices.

FIBER USED : Jute, cotton, polyamide , mod acrylic

FABRICS USED: Mostly fire retardant fabrics may be by using fire retardant fibers or by coating the fibers with fire retardant additives(bromides of phosphorus compounds).

INDU TECH

These are the Industrial Textiles, also known as Indutex. Indutech refers to woven, nonwoven and knitted fabrics used as part of industrial processes or incorporated in some way into industrial products. They are used in different ways by many Industries for activities such as separating and purifying industrial products, cleaning gases and effluents, transporting materials between processes and acting as substrates for abrasive sheets and other coated products.

FIBER USED: Carbon, E-glass, Cotton, Polyamide, Polyester, Polypropylene

They range from lightweight nonwoven filters, knitted nets and brushes to heavyweight coated conveyor belts. Silk-screen printing, filtration, plasma screens, propulsion lifting/ conveying equipment, sound-proofing elements, melting processes, roller covers, grinding technology, insulations, seals, fuel cell.

Industrial textiles: Filter media



Pile fibre stitch-bonded nonwoven Hycoknit®

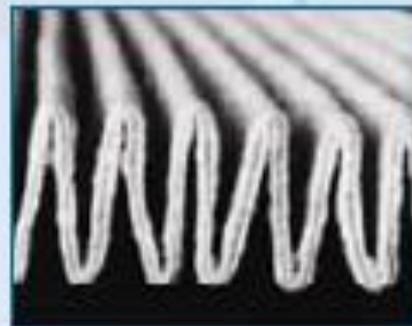
- regeneration of filter elements is possible
- special finishes (for instance hydrophobic) can be added during production process

Pocket air filter

Nonwoven scrim composite Hycofil®

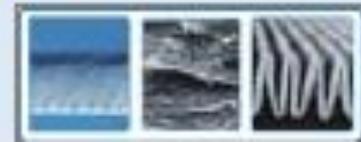


Filter cartridge



Pleated structure

- for applications up to 250°C
- high separating and cleaning performance



TEX

MED TECH

Med tech refers to woven, nonwoven and knitted fiber construction ,as an implantable, non implantable, extra corpeal device , health care and hygiene used in medical area. They include all the medical fabrics that are used in health and hygiene applications in both consumer and medical markets.

- FIBERS USED :**
- 1. Non implantable:** Cotton, Silk, Lyocell, Viscose, Chitosan, Polyamide, Plastic film, Polypropylene, Carbon, Glass, Polylactide, Polyglydid
 - 2. Implantable fibers:** Collagen, Chitin, Polyester, Polyamide, Polyethylene, Silicon, Polyglycolide, Polylactide, Polyacetyl
 - 3. Extracorpeal device:** hollow viscose, hollow polyester, hollow propylene, hollow silicon
 - 4. Health care and hygiene:** cotton, lyocell, viscose, polyester, polyamide, glass, polypropylene, polyethylene.

Non implantable textile fibers: are used for absorbent pad, wound contact layer, gauze dressing, orthopedic bandages, compression bandages, etc.

Implantable textiles fibers: are used for artificial skin, artificial ligaments, biodegradable sutures, artificial tendons, vascular grafts, heart valves, artificial joints and bones, etc.

Extra corpeal device fibers: are used for artificial kidney, artificial liver and mechanical lung to supply fresh blood, fresh plasma and fresh oxygen.

Health and hygiene fibers: are used for surgical gowns, surgical caps, surgical hosiery, blankets, pillow cases, absorbent layer, outer layer etc.

Medical textiles - Medtech

dressing material, textile goods for hospitals, textile material in protheses, ortheses textiles for surgery, rescue services etc.



PACKTECH

Packtech are the Packaging Textiles, also known as Packtex. It refers to woven, nonwoven and knitted fabrics used for making of packaging materials like bags, cords, twines, ropes, soft luggage, slings, tapes, films and sheeting's.

These Textiles have been used for packaging since ages. It ranges from heavyweight woven fabrics used for bags, packaging sacks, Flexible Intermediate Bulk Carriers (FIBCs) and wrappings for textile bales and carpets to the lightweight nonwovens used as durable papers, tea bags and other food and industrial product wrappings.

FIBERS USED: Cotton, Jute, Polyester, Polyamide

packaging material and nets, sacks and big bags, protective cover systems, tarpaulins



PROTECH

Protech are the Protective Textiles that refers to woven, nonwoven and knitted fabrics that are used as a part or whole to make protective textiles such as flame retardant textiles, gloves, tarpaulin, sleeping bags, protective clothing, warm textiles, high temperature resistant fabrics, clean room textiles, etc.

Protection against heat and radiation for fire fighter clothing against molten metals for welders, for bullet proof jackets or for chemical protective textiles are made with the help of specialty fibers such as aramid fibers used in making of bullet proof jacket, glass fibers used in fire proof jackets etc. Sometimes the protective textiles is also coated with special chemicals, for example, when used in manufacturing astronauts suits.

FIBRES USED: Meta-Para aramides – Nomex: high resistance, tear, tensile strength, expensive,
Wool viscoses polyamide – marlan : repellency of molten metal, heat insulation,
transparency.

Glass fiber - High resistance, insulating.

Modacrylic cotton – Marko wiki: Marko : electric arc flash protection, comfort,
flame-resistant, multiform, efficient, skin friendly, antistatic.

Polyamide – Kevlar : extreme resistance, low aging

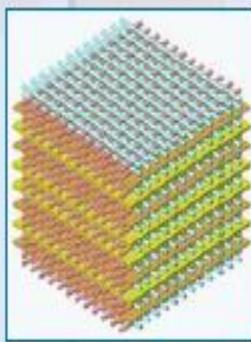
Cotton, Wool, Natural rubber, Polyester, Polyamide, Polypropylene ,
aramid, glass.

Protective textiles:

Explosion-proof textile transport container

Lightweight textile transport container with multifunctional properties:

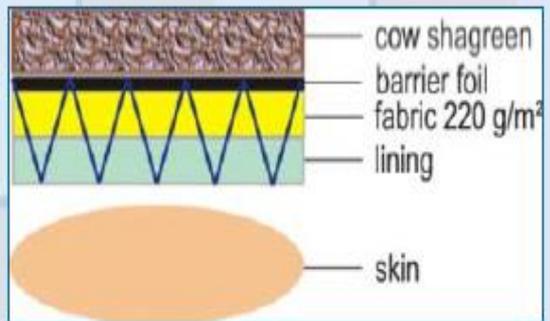
- protection against fragments from explosion (fragments are absorbed and the energy is accommodated in the textile structure)
- defined pressure reduction
- act as flame barrier
- resistance against high temperatures



www.fly-bag.net

Protective textiles:

Chemical and flame resistant protective gloves



Composite from chemical resistant barrier layers by coating with polymers and laminating with hot melt adhesive foils

Gloves for firefighters

SPORTTECH

Sporttech refers to all kind of textile materials as a part or whole used mainly for making sports wear including sports shoes and other sports accessories.

Increasing interest in active sports and outdoor leisure activities such as flying and sailing sports, climbing, cycling, winter and summer sports, indoor sport has led to immense growth in the consumption of textile materials in manufacturing sporting and related goods and equipment. These are sportswear fabrics, tents, wind breakers, breathable fabrics, diving suits, artificial turfs, balls, protective pads, helmet liners, artificial playing surfaces, etc.

FIBERS USED: Cotton, Polyester, Nylon, Poly propylene/ Polyethylene

Sports textiles - Sporttech



Protective clothing
for racing drivers



Functional
protective
clothing

MOBILTECH

These textiles, also known as Mobiltex, are used in transport industry, i.e. in construction of automobiles, railways, ships, aircraft & spacecraft. They are found in knitted, woven and nonwoven structures. Many coated and reinforced textiles are also used.

A number of materials are also used in the interior of cars. The most obvious are seat covers, safety belts and airbags, for the sealing seat belts, non-woven for cabin air filtration, parachutes, inflatable boats, air balloons. Truck covers and restraints are significant textile end-uses in the transportation sector. They can range from simple ropes and tarpaulins to highly engineered flexible curtain system and webbing tie-downs.

FIBERS USED: Wool, viscose, polyester, nylon, polypropylene, carbon



MOBILTECH

OEKOTECH

These are the Eco-friendly Textiles, also known as Oekotex or Ecotex. They are mostly used in environmental protection applications floor sealing, erosion protection, air cleaning, prevention of water pollution, water cleaning, waste treatment/recycling, depositing area construction, product extraction, domestic water sewerage plants. They are even gaining unimaginable popularity in other sectors of textile industry. Clothing, home furnishing, fashion accessories etc. all now come in eco-friendly versions made of oekotech.

FIBERS USED: Jute, wool, polyester, polypropylene

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